

CLAIMS

1. An apparatus for forming a security product comprising a printing press and diffraction grating forming means.

2. An apparatus as claimed in claim 1 wherein the printing press comprises any one or more of a

- a) a feed system;
- b) means to carry an image to be printed;
- c) means to apply an ink to;
- d) means to dry or cure the ink; and
- e) means to carry a printed security product.

3. An apparatus as claimed in claim 2 wherein the feed system comprises a sheet or web feed system.

4. An apparatus as claimed in any one of claims 2 or 3 wherein the means to carry an image comprises at least one cylinder or a plate.

5. An apparatus as claimed in claim 4 wherein the means to carry an image comprises a plurality of cylinders.

6. An apparatus as claimed in claim 5 wherein each cylinder carries an engraved image.

7. An apparatus as claimed in any one of claims 1 to 6 comprising a plurality of print units.

8. An apparatus as claimed in any one of claims 2 to 7 wherein the means to carry the printed security product may comprise a delivery system for stacking sheets or holding finished reels.

9. An apparatus as claimed in any one of the previous claims wherein the printing press comprises in line, an apparatus to transfer the diffraction grating to a substrate.

10. A method for forming a security product comprising the steps of:

- b) providing a sheet of base material, said sheet having an upper and lower surface;
- c) depositing a metallic ink on at least a portion of the diffraction grating; and
- d) forming a diffraction grating on at least a portion of the metallic ink.

11. A method for forming a holographic diffraction grating on a substrate comprising the steps of:

- a) applying a curable compound to at least a portion of the substrate;
- b) contacting at least a portion of the curable compound with diffraction grating forming means;
- c) curing the curable compound and
- d) depositing a metallic ink on at least a portion of the cured compound.

12. An in-line method of printing on a substrate using a conventional printing press apparatus together with means for forming a diffraction grating, comprising the steps of:

- a) forming a diffraction grating on a discrete portion of the substrate; and
- b) depositing a metallic ink on at least a portion of the diffraction grating.

13. A method for forming a holographic diffraction grating on a substrate comprising the steps of:

- a) depositing on at least a portion of the substrate a composition comprising a metallic ink admixed with a curable compound;

b) forming a diffraction grating on at least a portion of the composition.

14. A method for forming a holographic diffraction grating comprising the steps of:

- a) providing a sheet of base material;
- b) depositing a release coating to at least a portion of the base material;
- c) depositing a curable compound on at least a portion of the coated base material;
- d) forming a diffraction grating on at least a portion of the curable compound;
- e) depositing a metallic ink on at least a portion of the diffraction grating; and
- f) depositing an adhesive on at least a portion of the metallic ink.

15. A method as claimed in any one of claims 10 to 14 wherein the diffraction grating is a component of a holographic image.

16. A method as claimed in any one of claims 10 to 15 wherein the diffraction grating is deposited onto a substrate.

17. A method as claimed in claim 16 wherein the substrate comprises a passport, identification card, drivers license, compact disc or packaging.

18. A method as claimed in claim 15, 16 or 17 wherein the diffraction grating is transferred to the surface of the substrate specifically in registration or randomly for subsequent further registration of additional print units.

19. A method as claimed in any one of claims 10 to 18 wherein the thickness of the metallic ink when deposited on a substrate is sufficiently thin as to permit the transmission of light therethrough.

20. A method as claimed in claim 19 wherein the percentage of light transmission is at least 30%.

21. A method as claimed in claim 20 wherein the percentage of light transmission is at least 50%.

22. A method as claimed in claim 21 wherein the percentage of light transmission is at least 80%.

23. A method as claimed in claim 19 wherein the optical density of metallic ink when deposited is in the range of light transmission

24. A method as claimed in claim 23 wherein the optical density is in the range of 0.2 to 0.8 as measured by a Macbeth densitometer.

25. A method as claimed in claim 24 wherein the optical density is in the range is 0.5 to 0.8.

26. A method as claimed in claim 25 wherein the optical density is 0.7.

27. A method as claimed in claim 16 or 17 wherein the substrate comprises any sheet material.

28. A method as claimed in claim 16, 17 or 27 wherein the substrate is substantially transparent, translucent, or opaque.

29. A method as claimed in any one of claim 16, 17, 27 or 28 wherein the substrate comprises paper, filmic material or metal.

30. A method as claimed in any one of claims 16, 17, 27 to 29 wherein the substrate is cast, calendared, blown, extruded and/or biaxially extruded.

31. A method as claimed in any one of claims 16, 17, 27 to 30 wherein the substrate comprises at least one polymeric compound.

32. A method as claimed in claim 31 wherein the substrate comprises any one or more selected from the group comprising polythyleneterephthalate, polypropylene

propafilm, polyvinylchloride , rigid pvc, cellulose, tri-acetate, acetate polystyrene, polyethylene, nylon, acrylic and polytherimide board.

33. A method as claimed in any one of claims 16; 17, 27 to 30 wherein the substrate comprises paper made from wood pulp, cotton or synthetic wood free fibres.

34. A method as claimed in claim 33 wherein the paper is coated, calendared or machine glazed.

35. A method as claimed in any one of claims 16, 17, 27 to 34 wherein the step of forming of a diffraction grating on a substrate may comprise depositing a curable composition on at least a portion of the substrate.

36. A method as claimed in claim 35 wherein the curable composition is a lacquer.

37. A method as claimed in claim 35 or 36 wherein the curable composition is deposited by means of gravure or flexographic printing.

38. A method as claimed in claim 35, 36 or 37 wherein the curable lacquer is curable by means of an ultraviolet (U.V.) light or an electron beam.

39. A method as claimed in any one of claims 10 to 38 wherein the transfer speed is in the range of 10 metres to 20,000 metres per hour,

40. A method as claimed in claim 39 wherein the transfer speed is 18,000 metres per hour.

41. A method as claimed in any one of claims 35 to 40 wherein the diffraction grating is formed on the surface of the curable composition as it is disposed on the substrate.

42. A method as claimed in any one of claims 10 to 41 wherein the metallic ink is applied to a substrate by means of conventional printing press.

43. A method as claimed in claim 42 wherein the substrate is pre-printed in-line.

44. A method as claimed in claim 42 wherein the substrate is pre-printed off-line.

45. A method as claimed in claim 42 wherein the substrate is subsequently printed in-line.

46. A method as claimed in any one of claims 10 to 45 wherein the metallic ink comprises metal pigment particles and a binder.

47. A method as claimed in claim 46 wherein the pigment particles comprise any one or more selected from the group comprising aluminium, stainless steel, nichrome, gold, silver, platinum and copper.

48. A method as claimed in claim 47 wherein the thickness of pigment particles is in the range 100 to 500 angstroms.

49. A method as claimed in claim 48 wherein the thickness of pigment particles is in the range of 190 to 210 angstroms.

50. A method as claimed in any one of claims 46 to 49 wherein the metallic ink has a very low binder content and a high pigment to binder ratio.

51. A method as claimed in any one of claims 10 to 50 wherein the means for forming a diffraction grating comprises a shim or a seamless roller.

52. A hologram obtainable using the method of any one of claims 10 to 51.